

Agrobiodiversity and Agroecology: Inaugural Editorial

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Dear colleagues,

Welcome to the new journal “Agrobiodiversity & Agroecology”!

Biodiversity is the diversity of life with millions of species, mostly unknown, that represent the immensity, and, at the same time, the complexity of life in ecosystems. This concept was popularized in 1992 with the Convention on Biological Diversity signed in Rio de Janeiro (Brazil). For last 30 years, the regular Conferences of the Parties (COPs) underline the need to take a new look at the balance of the planet. Only during the COP13 in Mexico, and the COP14 in Egypt, the biodiversity was really considered important in/for the agricultural sector. We hope that the launching of this new journal ‘Agrobiodiversity & Agroecology’ (A&A) will help enhance the recognition of biodiversity in agricultural landscapes and the importance of biodiversity for agricultural systems.

Biodiversity, a contraction of “biological diversity”, is an expression designating the variety and diversity of the living world. In its broadest sense, this word is almost synonymous to “Life on Earth”. Biological diversity has been defined as “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems” (Article.2 of the Convention on Biological Diversity, 1992). We need to consider the diversity of living species (microorganisms, plants, animals) present in an ecosystem in which they live, but also all the interactions of species between them and with their environment.

If 1992 represents the signature of the Convention on Biological Diversity, the concept of sustainable development, at the same time, based on social, economic and ecological aspects, was gaining ground. It is why, for the last 30 years, biodiversity has also been understood through economic, historical and social dimensions, and not only through ecological dynamics, even if the Convention on Biological Diversity considers only the following four main dimensions: genetic, specific, ecosystemic and cultural diversities.

Biodiversity in Agriculture or *Agrobiodiversity* refers to all plant and animal breeds in agriculture, their wild relatives, their species of origin and the species that interact with them e.g., pollinators, symbionts, parasites, predators, decomposers and competitors, as well as the full range of environments in which agriculture is practiced, not only arable land or cultivated fields. It, thus, encompasses the variety and variability of living organisms that contribute to food and agriculture in the broadest sense. Agrobiodiversity includes genes, populations, species, communities, ecosystems, and landscape components as well as human interactions with them. It also includes many

habitats and species outside of agricultural systems that benefit agriculture and enhance the functions of the cultivated ecosystem (Jakson *et al.*, 2005).

From biodiversity to *agrobiodiversity*, we consider the same different levels but all depend on a strong cultural component: the Genes (source of adaptability based on the variability of individuals as a reservoir for plant breeding), the Species (diversification of cropping systems, and multiple uses of plants and animals), the Ecosystems (challenges and opportunities to conserve them through agricultural activity, services perceived and provided like water and soil conservation, pollination, etc.) and the Culture (to understand socio-ecosystems as a whole with knowledge, innovations and practices of local communities and sustainable use). Plant genetic resources (PGRs) are a very small part of agrobiodiversity that include the diverse plant genetic material contained in traditional varieties and modern cultivars, as well as wild relatives of cultivated species and other wild plant species that can be used now or in the future for food and agricultural purposes (FAO, 1996).

Agriculture has always been based on access and exchange, not on exclusivity. PGRs have been collected and exchanged for more than 10,000 years considering propagation on the planet with human migrations, improvement of cultivars according to local contexts, use and cultivation of a large number of species. People have often traded their local plants and breeds. Farmers exchange seeds and grow exotic material amid their usual plants to avoid declines in productivity. Farmers are not only curators but also creators of diversity because they domesticate the original wild plants and animals, they add to diversity by adapting cultivated plants to new ecosystems and human needs, and they are always discovering new crops and animals.

The value of agrobiodiversity lies as much in the intra-specific diversity as in the number of species. Farmers contribute to increasing diversity through farming and cropping systems. When a system dies, diversity must be conserved *ex situ*. Countries and regions are "interdependent" because all depend on crops originating from other countries. Most of the plant genetic resources are found in tropical and semi-tropical countries, not in the "industrial north". It is why *agrobiodiversity* always requires human, active and, continuous, management. Agriculture has emerged independently on several continents. Today, we estimate about 391,000 known vascularized plants, but only 31,000 are used by humans, and only 5,000 participate in humans' diet. Merely, 20 plants provide the majority of the world's food (cereal, root, tuber, legume). From the origin of agriculture, it is associated with a depletion of genetic diversity in cultivated plants and domesticated animals compared to wild relatives. Despite this low genetic diversity, the diffusion of domesticated plants has created a high level of agrobiodiversity. Nevertheless, the development of commercial varieties has greatly reduced the diversity cultivated.

Cultivated diversity and diversity of crop wild relatives allow adaptation to climate change. However, we earn a great risk of extinction of these wild relatives today. Moreover, cultivating the diversity alone will not be enough to adapt to global changes, given the magnitude of the change phenomena. It is why inter-specific diversity is a central axis of agroecology for promoting the diversification of cropping systems to take advantage of the complementarities and synergies between varieties and species, maximizing ecosystem services while limiting negative externalities at different spatial scales. Associated crops can provide higher yields while maintaining less weeds. Ecological landscape approaches confer new opportunities for agriculture sustainability. Pests and auxiliaries are mobile in the landscape, so the simple landscapes host fewer auxiliaries and are more susceptible to infestations.

Ecosystemic and biocultural diversity are key issues for agroecology and agrobiodiversity. The importance of an agro-ecosystemic approach with local

stakeholders is the key for considering and integrating that cultivated diversity and cultural diversity are interrelated. Social organizations influence the dynamics of cultivated biodiversity. The agroecosystem reflects an organization of different activities and crops in space.

The spatial organization of agrarian societies defines a diversity of agroecosystems that reflect not only an adaptation to the environment but also particular social rules. The agricultures of the South do not compartmentalize living organisms according to western wild/cultivated components but consider them in a continuum of which they perceive the flows [of genes] and integrate them into their agricultural practices. The new forms of biodiversity governance at different scales must take into account local rules and customs, in order to respect farmers' rights and facilitate dialogue between actors with multiple interests. The multiple dimensions of biodiversity make it a biological, social and political object at the same time, which requires a real dialogue between the different parties for its conservation. This representation of life defines a particular relationship with nature that we must understand in order to build on it and better support the adaptation of family farms to the global changes underway.

These elements reflect the general direction we want to give to this new journal *Agrobiodiversity & Agroecology* (A&A). It is much more than two concepts. The perspective of the journal A&A is to renew and to consolidate their link publishing integrated approaches of biodiversity in agricultural systems from all around the world. Acting as Editor-in-Chief, I want to be inclusive by giving the opportunity to researchers from the South to publish in a journal without any fees for the open-access for disseminating their work and being connected to the international community of A&A. This opportunity to publish in the journal is also open to farmers' organizations and NGOs for being really represented as co-authors with any researcher acting with them in participatory research for presenting together their viewpoints on the research.

I would like to wish the authors bring a sustainable and evidence-based content to the future articles. The Scientific Editorial Board, following the principles of the academic integrity, will support and encourage authors for innovative and promising articles.

I wish all the success and inspiration to the authors and journal staff.

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